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[HYPERBRANCHED POLYMERS] **PROCESS FOR PRODUCING HYPERBRANCHED POLYMERS**

Cross References to Related Applications

This application is a divisional of U.S. Serial No. 09/873,634, allowed, which is a continuation of U.S. Serial No. 09/389,821 filed September 3, 1999, now issued as U.S. Patent No. 6,265,511, which is a divisional of U.S. Serial No. 08/906,140 filed August 5, 1997, now issued as U.S. Patent No. 5,986,020.

**MARKED UP VERSION OF CLAIMS**

36. (New) A continuous, high temperature polymerization process for preparing a substantially gel-free polymerized polymeric product comprising:

(a) continuously charging into a reactor monomers comprising divinyllic monomers comprising at least one divinyllic monomer and monoethylenically unsaturated monomers comprising at least one monoethylenically unsaturated monomer;

(b) maintaining a level in the reactor such that the reactor is at least substantially filled; and

(c) polymerizing the monomers to produce a polymeric product, wherein the polymeric product is formed substantially free of gel.

37. (New) The continuous, high temperature polymerization process for preparing a substantially gel-free polymerized polymeric product according to claim 36, wherein the monomers comprise at least about 3% by weight of the divinyllic monomers comprising at least one divinyllic monomer and about 50% to about 97% by weight of the monoethylenically unsaturated monomers comprising the at least one monoethylenically unsaturated monomer.

38. (New) The continuous, high temperature polymerization process for preparing a substantially gel-free polymerized polymeric product according to claim 37, wherein the monomers comprise at least 6% by weight of the divinyllic monomers and from about 50% to 94% by weight of the monoethylenically unsaturated monomers.

39. (New) The continuous, high temperature polymerization process for preparing a substantially gel-free polymerized polymeric product according to claim 37, wherein the monomers comprise from 12% to about 30% by weight of the divinyllic monomers.

40. (New) The continuous, high temperature polymerization process for preparing a substantially gel-free polymerized polymeric product according to claim 36, wherein the divinyllic monomers comprise divinyl benzene.

41. (New) The continuous, high temperature polymerization process for preparing a substantially gel-free polymerized polymeric product according to claim 36, wherein the divinyl monomers consist of divinyl benzene.

42. (New) The continuous, high temperature polymerization process for preparing a substantially gel-free polymerized polymeric product according to claim 36, wherein (c) further comprises maintaining the temperature of the reactor at a temperature of from about 250°C to about 400°C.

43. (New) The continuous, high temperature polymerization process for preparing a substantially gel-free polymerized polymeric product according to claim 36, further comprising adding a radical initiator to the reactor while the monomers are continuously charged into the reactor.

44. (New) The continuous, high temperature polymerization process for preparing a substantially gel-free polymerized polymeric product according to claim 43, wherein the initiator is mixed with the monomers when the monomers are continuously charged into the reactor or the initiator is added to the reactor from a feed separate from the monomers.

45. (New) The continuous, high temperature polymerization process for preparing a substantially gel-free polymerized polymeric product according to claim 36, further comprising adding a solvent to the reactor.

46. (New) The continuous, high temperature polymerization process for preparing a substantially gel-free polymerized polymeric product according to claim 45, wherein the solvent is selected from the group consisting of n-hexane, toluene, propylene glycol monomethyl ether acetate, 2-ethyl-1-hexanol, 1-octanol, tripropylene glycol methyl ether, acetone, methyl iso-butyl carbinol, diethyleneglycol butyl ether, propylene glycol, tert-butyl ether, ethyl 3-ethoxypropionate, ethylene glycol monobutyl ether, ethylene glycol monomethyl ether acetate, 2-ethylhexyl acetate, diacetone alcohol, ethylene glycol 2-ethylhexyl ether, cyclohexanol, 2-ethyl-1-butanol, N-methyl-2-pyrrolidone, dipropylene glycol butyl ether, 2-methyl-1-butanol, 1-pentanol, diethylene glycol butyl ether acetate, diethylene glycol

monomethyl ether, propylene glycol monobutyl ether, benzyl alcohol, 1-methoxy-2-butanol, propylene glycol propyl ether, 2-methyl-1-pentanol, diethylene glycol monoethyl ether, ethylene glycol hexyl ether, sec-butanol, tert-amyl alcohol, phenol, tert-butanol, tripropylene glycol, ethylene glycol diacetate, dipropylene glycol methyl ether n-butanol, furfuryl alcohol, isobutanol, diethylene glycol monoethyl ether acetate, ethylene glycol monoethyl ether, diethylene glycol monopropyl ether, isopropanol, tetraethylene glycol, ethylene glycol propyl ether, n-propanol, ethylene glycol methyl ether, propylene glycol propyl ether, tetrahydrofurfuryl alcohol, acetonitrile, 2-phenoxyethanol, dimethyl sulfoxide, hexylene glycol, allyl alcohol, 2-pyrrolidinone, ethanol, triethylene glycol, and methanol.

47. (New) The continuous, high temperature polymerization process for preparing a substantially gel-free polymerized polymeric product according to claim 36, wherein the monomers are in a mixture comprising the monomers and a surfactant or a chain transfer agent.

48. (New) The continuous, high temperature polymerization process for preparing a substantially gel-free polymerized polymeric product according to claim 36, wherein the reactor is a continuous stirred tank reactor or a continuous loop reactor.

49. (New) The continuous, high temperature polymerization process for preparing a substantially gel-free polymerized polymeric product according to claim 36, wherein (c) further comprises maintaining a residence time of from about 2 minutes to about 60 minutes in the reactor.

50. (New) The continuous, high temperature polymerization process for preparing a substantially gel-free polymerized polymeric product according to claim 36, wherein (c) further comprises maintaining a residence time of from about 10 minutes to about 20 minutes in the reactor.

51. (New) The continuous, high temperature polymerization process for preparing a substantially gel-free polymerized polymeric product according to claim 36, wherein the at least one monoethylenically unsaturated monomer is selected from the group consisting of

styrene,  $\alpha$ -methylstyrene, vinyl toluene, 4-methylstyrene, tertbutylstyrene, 2-chlorostyrene, vinylpyridine, vinylpyrrolidone, maleic anhydride, methyl crotonate, sodium crotonate, acrylic acid and its salts, methyl acrylate, ethyl acrylate, propyl acrylate, isopropyl acrylate, butyl acrylate, 2-ethylhexyl acrylate, decyl acrylate, hydroxyethyl acrylate, hydroxypropyl acrylate, methacrylic acid and its salts, methyl methacrylate, ethyl methacrylate, propyl methacrylate, hydroxypropyl methacrylate, isopropyl methacrylate, butyl methacrylate, sec-butyl methacrylate, isobutyl methacrylate, n-amyl methacrylate, isoamyl methacrylate, n-hexyl methacrylate, tert-butyl methacrylate, 2-ethylhexyl methacrylate, n-octyl methacrylate, methallyl methacrylate, phenyl methacrylate, benzyl methacrylate, allyl methacrylate, cyclohexyl methacrylate, 2-hydroxyethyl methacrylate, 2-hydroxypropyl methacrylate, N,N-dimethylaminoethyl methacrylate, N,N-diethylaminoethyl methacrylate, tert-butylaminoethyl methacrylate, 2-sulfoethyl methacrylate, trifluoroethyl methacrylate, glycidyl methacrylate, 2-n-butoxyethyl methacrylate, 2-chloroethyl methacrylate, 2-ethylbutyl methacrylate, cinnamyl methacrylate, cyclopentyl methacrylate, 2-ethoxyethyl methacrylate, furfuryl methacrylate, hexafluoroisopropyl methacrylate, 3-methoxybutyl methacrylate, 2-methoxybutyl methacrylate, 2-nitro-2-methylpropyl methacrylate, 2-phenoxyethyl methacrylate, 2-phenylethyl methacrylate, propargyl methacrylate, tetrahydrofurfuryl methacrylate, tetrahydropyranyl methacrylate, methacrylamide, N-methylmethacrylamide, N-ethylmethacrylamide, N,N-diethylmethacrylamide, N,N-dimethylmethacrylamide, N-phenylmethacrylamide, acrylamide, N,N-diethylacrylamide, N-ethylacrylamide, methyl 2-cyanoacrylate, methyl  $\alpha$ -chloroacrylate, methacrolein, acrolein, methacrylonitrile, acrylonitrile, and mixtures thereof.